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# Quantifying the spinal locomotor network-driven oculomotor behavior and its developmental adaptation in larval and adult frog

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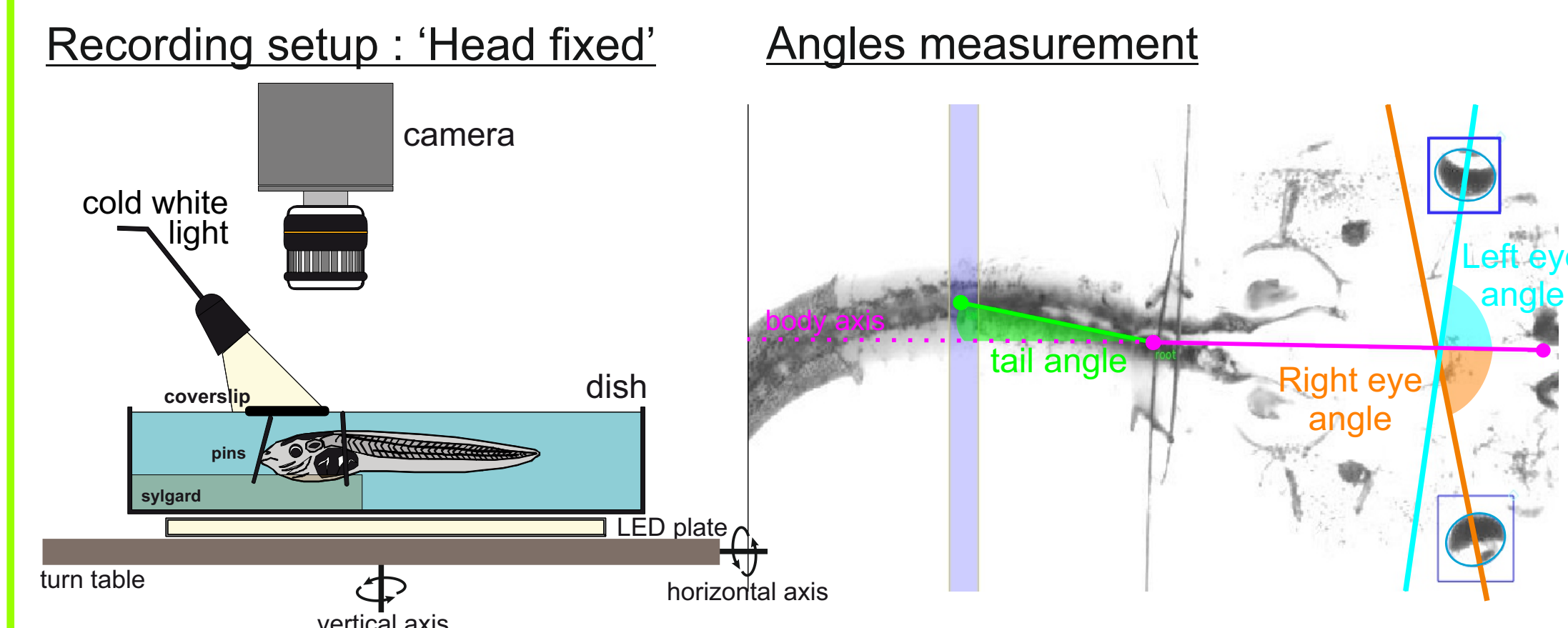
## Introduction

Body and head movements require compensatory eye adjustments to maintain a stable visual field. Our previous findings from *in vitro* experiments on *Xenopus laevis* revealed that during locomotion, such gaze stabilization is produced not only by classical visuo-vestibular reflex feedback but also by feed-forward signaling from the spinal locomotor central pattern generator (CPG) itself. However, the latter's precise influence on oculomotor behavior remains poorly understood. Here, we aimed to provide a fine *in vivo* quantification of compensatory eye movements produced by the locomotor CPG efference copy before metamorphosis, during larval undulatory swimming. Moreover, we studied in the same stages the development of visuo-vestibular reflexes in order to explore the relationship between the maturation of the efference copy signal and that of visuo-vestibular reflexes. Our results show that a co-maturation of the two systems ensures a high degree of compensatory eye movement at all developmental stages.

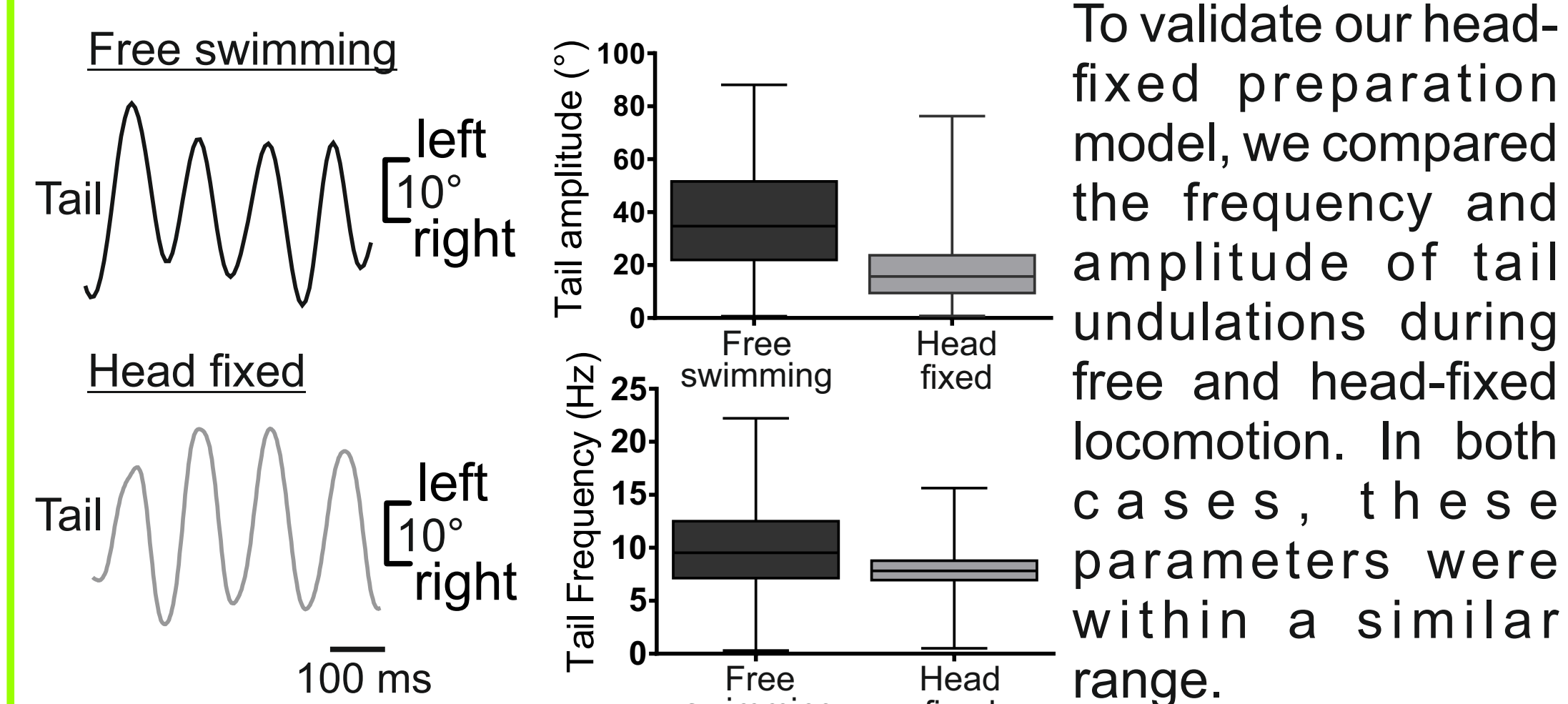
## Materials and Methods

**Recordings of locomotor and oculomotor behavior:** Movement patterns of *Xenopus* tadpoles (stages 40 to 58), which were fixed by the head on sylgard inside a petry dish, were recorded by a high frequency camera placed above. 3 angles from the body axis were measured from video recordings using home-made software: i, tail angle; ii, left eye angle; iii, right eye angle.

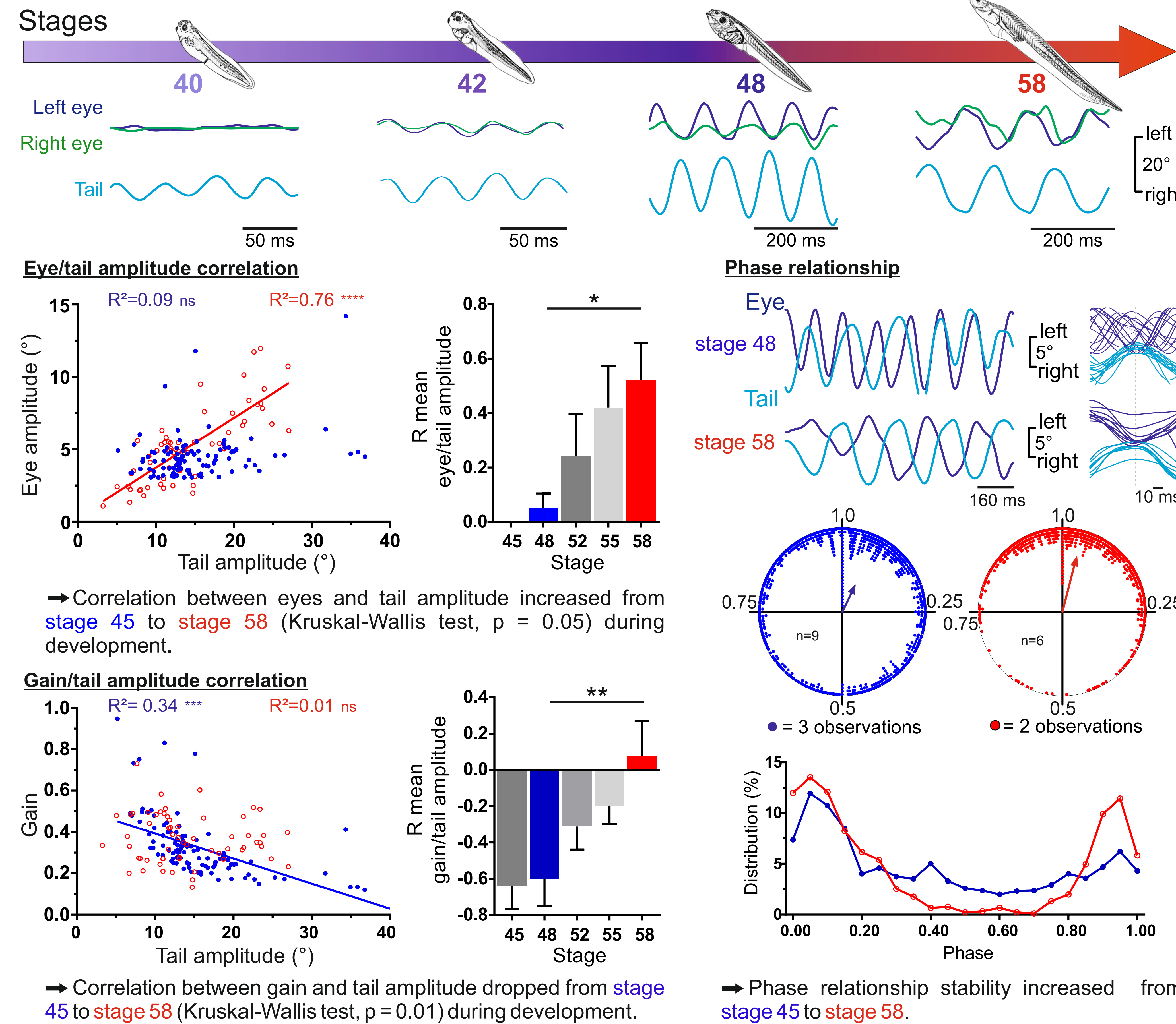
**Visuo and vestibular stimulation:** With the same recording setup, the petry-dish was placed on a turn (vertical and horizontal axis) table in order to stimulate vestibular reflexes. A small drum centered on the table provided visual stimuli to induce optokinetic reflexes.



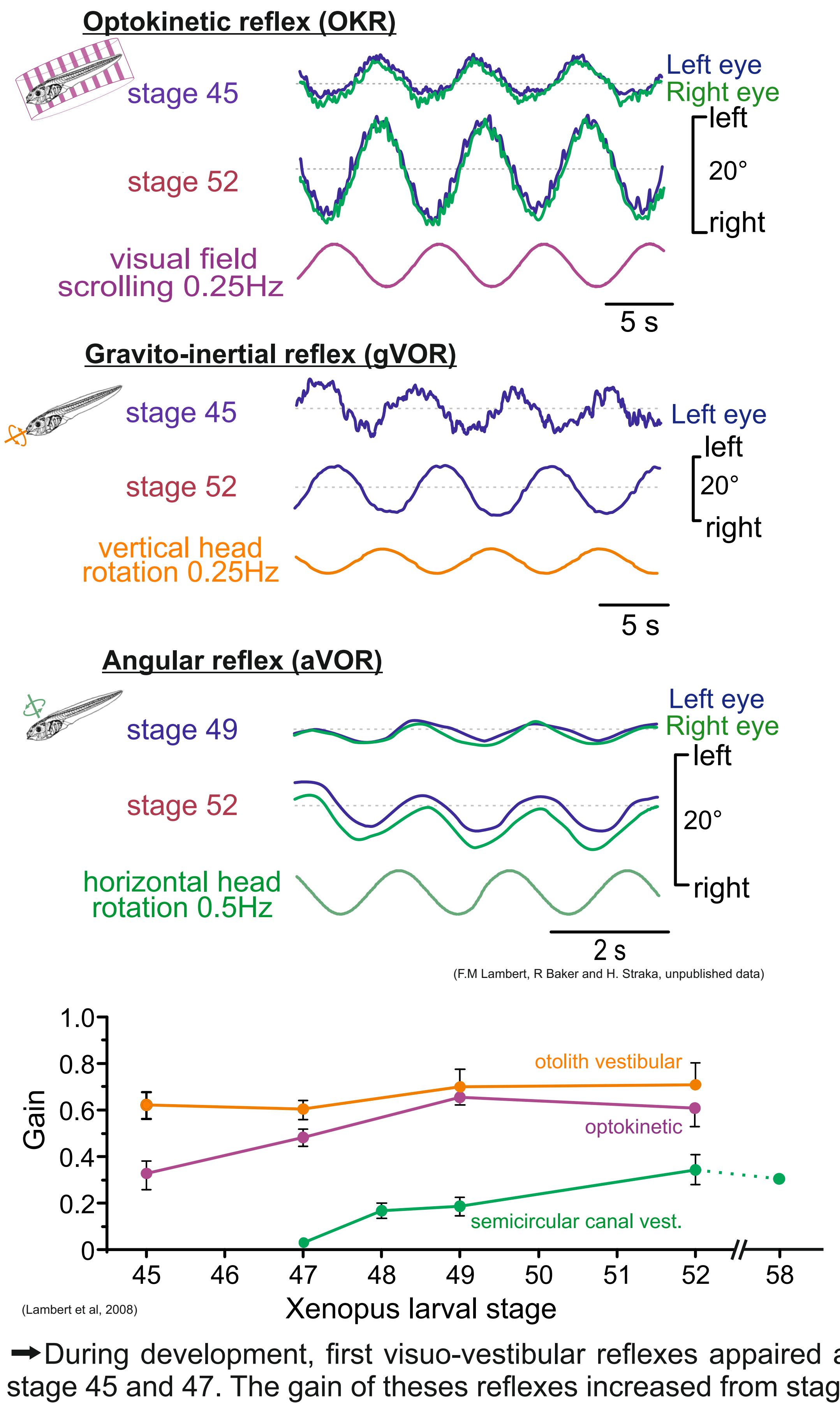
## Model validation



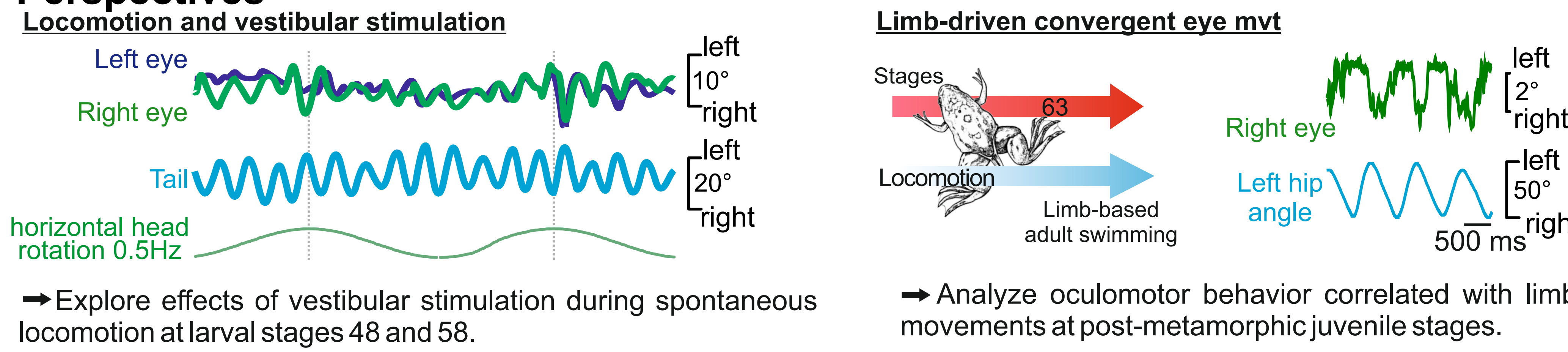
## Locomotor-driven oculomotor behavior



## Visuo-vestibular reflexes



## Perspectives



## Conclusion

